Trend Study 16B-19-99

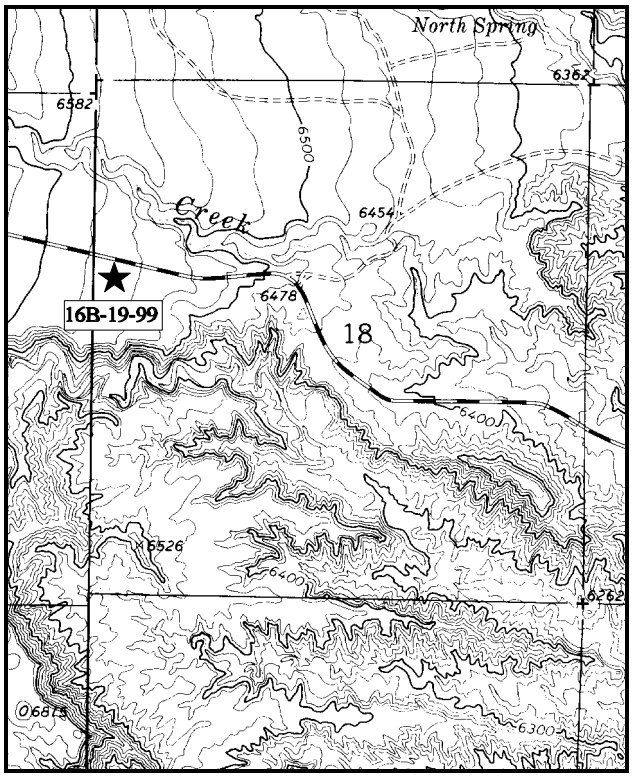
Study site name: North Spring Bench . Range type: Big Sagebrush - Grass .

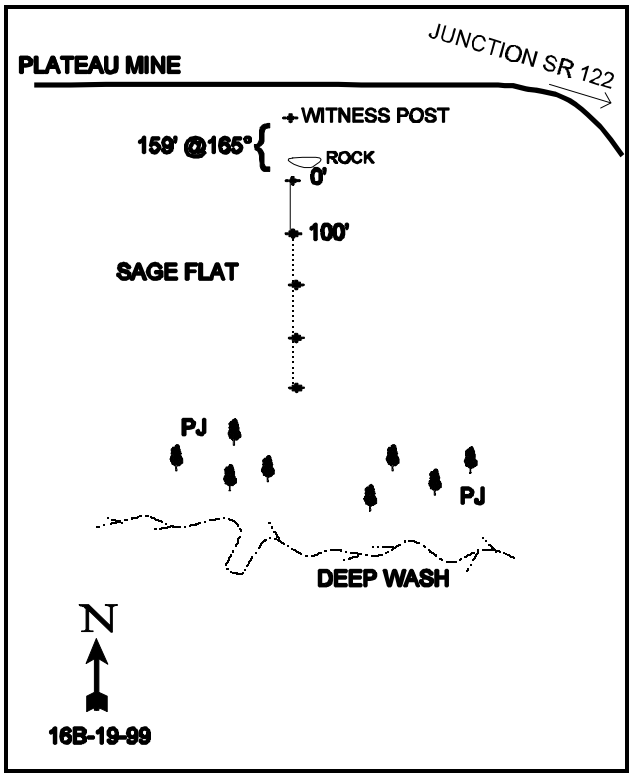
Compass bearing: frequency baseline 165°M.

Footmark (first frame placement) 5 feet, footmarks (frequency belts) line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the junction of state highways 10 and 122 south of Price, go west on SR 122. Go 3.1 miles to a major fork. Go right towards Wattis for 5.1 miles. Look for a witness post 10 feet off the south side of the road in a sagebrush flat. The first baseline stake is 28 paces south of the witness post, and located behind a large rock. It is marked with a red browse tag (#9013). The other study posts, all 18" fenceposts, are south at 100 foot intervals.





Map Name: Pinnacle Peak Diagrammatic Sketch

Township 15S , Range 9E , Section 18 UTM 4374590.746 N, 502898.434 E

DISCUSSION

Trend Study No. 16B-19 (30-5)

The North Spring Bench trend study samples part of the critical deer winter range below Wattis in the Spring Creek area. In most years, deer occupy the area until the first of May. This southern end of the Gordon Creek sagebrush range receives heavy use by deer as evidenced by the high quadrat frequency of pellet-groups on the site. Managed by the BLM, the North Springs allotment is used by 1,000 sheep from May 1 to June 30. Deer use is currently extremely high with an estimated 159 deer days use/acre (392 ddu/ha) estimated from 1999 on site pellet group transect data. Several deer beds were found underneath large pinyon trees near the end of the sampling baseline.

The study is on a nearly level, natural sagebrush flat surrounded by mature pinyon-juniper at an elevation of 6,600 feet. Drainage and aspect is generally to the east. The soil is a sandy clay loam with a neutral pH (7.2). The soil is moderately deep with an estimated effective rooting depth of 16 inches. A stoniness index shows rock to be uniformly distributed throughout the upper 20 inches of the profile. A calcium carbonate hardpan is present about 12 inches below the surface which may be restrictive to plants roots. Surface runoff has caused plant pedestaling and moderate soil movement. However, the gentle slope and adequate vegetation and litter cover help keep erosion at a minimal level. There are no major gullies, but nearby washes show continued down cutting and active erosion. Bare ground has continually decreased since the initial reading in 1988.

The key browse species is Wyoming big sagebrush. Although the shrubs displayed fair leader growth, there were many indicators of a downward trend during the 1988 and 1994 readings. The population declined by 24% between 1988 and 1994, however much of this change can be attributed to the much larger sample size which began in 1994 giving significantly improved population estimates for discontinuous browse distributions. One should probably pay more attention to other measured parameters. For example, over half the population was decadent (52% in 1988, and 62% in 1994), and one in four shrubs was classified as dead. The majority of the moderately dense population was mature, with very few young in either 1988 or 1994. During the 1994 reading more seedlings were encountered but the number of young declined by almost half. Use was heavy in 1988 with 32% of the population classified as heavily browsed. In 1994, only 8% showed heavy use. Vigor declined however, from 10% with poor vigor in 1988 to 27% by 1994. Currently, the population of Wyoming big sagebrush appears to be improving. In 1999, percent decadency decreased from 62% to 31%, and plants with poor vigor decreased from 27% to 14%. Biotic potential is good at 12%, and recruitment from young plants is high at 23%. The proportion of decadent plants classified as dying also slightly decreased in 1999, from 43% to 36%. One area of concern is that use increased again in 1999 with heavy use displayed on 48% of the population. Continued heavy use, coupled with other environmental parameters, could cause the current improvements to reverse the improving trend in the future.

Increaser species, most notably broom snakeweed, was very abundant in 1988 (17,266 plants/acre) and age class composition indicated an increasing population. Due to the recent drought conditions, snakeweed died off in large numbers in 1994 with only 860 plants/acre being estimated. In 1999, the population drastically increased to an estimated 16,500 plants/acre with most of these being mature plants. The return to more normal precipitation patterns in recent years is most likely one of the main catalysts for this increase. Prickly pear is also quite abundant with the population currently estimated at 4,900 plants/acre.

Pinyon and juniper trees surround the site and are encroaching into the sagebrush flat. Point quarter data taken during the 1999 reading estimate a density of 100 pinyon trees/acre, and 19 juniper trees/acre. Average stem diameter for pinyon is 2 1/8 inches, while that of juniper is 2 2/3 inches.

The abundant and vigorous warm-season grass, blue grama, is not an important forage source on this site, although it does provide good ground cover. In 1994, it provided over 6% cover, in 1999, it provided just under 6% cover. Other perennial grasses that are common include: western wheatgrass, Indian ricegrass, and

bottlebrush squirreltail. Western wheatgrass is the most abundant species in sum of nested frequency and quadrat frequency. It also provides the second highest cover of the grasses. Needle-and-thread significantly decreased in 1999 as it was only sampled in one quadrat. Forbs are not significant at this site, currently providing less than 1% cover.

1994 TREND ASSESSMENT

Ground cover characteristics have improved on this site. Vegetation cover is quite high for a Wyoming big sagebrush site. Even though grasses and forbs make up only 33% of the vegetation cover, it appears to be evenly dispersed. Percent cover of litter has improved from 27% to 34%. The high sum of nested frequency for litter indicates well dispersed litter cover. Percent bare ground declined from 53% to 47%. Erosion on the site is minimal due to the protective cover combined with the gentle terrain. Even with decreased heavy use on the Wyoming big sagebrush, the browse trend is down because the sagebrush community has increased percent decadence (52-62%), the proportion of shrubs in poor vigor has increased (10-27%), and there is one dead plant in every five. Trend for herbaceous understory has also declined since 1988. Sum nested frequency of perennial grasses and forbs have declined. Normal precipitation patterns will likely reverse this trend.

TREND ASSESSMENT
soil - improving
browse - down
herbaceous understory - down slightly

1999 TREND ASSESSMENT

Trend for soil is slightly improved. Some soil movement is apparent, but the gentle terrain keeps erosion at minimal levels directly on the site. Vegetation cover increased and bare ground decreased. Trend for browse is stable overall. The key species, Wyoming big sagebrush, shows improving trends with decreased decadency from 62% to 31%. Plants displaying poor vigor also decreased from 27% to 14%. Recruitment from young plants is currently high at 23%, and biotic potential is moderate at 12%. The main concern is that heavy use increased to 48%. This species is stable at the present time, but with continued heavy use (and drought), these improvements will most likely reverse current trend. Broom snakeweed drastically increased in 1999 due to more normal precipitation patterns in recent years. The herbaceous understory trend is stable. Sum of nested frequency for perennial species increased in 1999. Perennial grasses dominate the herbaceous component at this site.

TREND ASSESSMENT
soil - slightly improved, but still only fair condition
browse - stable for the key species Wyoming big sagebrush
herbaceous understory - stable

HERBACEOUS TRENDS --
Herd unit 16B, Study no: 19

Type	Species	Nested Frequency '88	'94	'99	Quadrat Frequency '88	'94	'99	Average Cover % '94	'99
G	Agropyron smithii	$_{a}$99	$_{a}$125	$_{b}$171	34	42	61	.85	2.81
G	Bouteloua gracilis	$_{b}$213	$_{a}$147	$_{a}$136	74	49	49	6.20	5.74
G	Bromus tectorum (a)	-	$_{a}$7	$_{b}$96	-	3	35	.01	.88
G	Oryzopsis hymenoides	$_{a}$37	$_{a}$23	$_{b}$64	19	11	28	.22	1.22
G	Sitanion hystrix	$_{b}$153	$_{a}$76	$_{a}$80	65	30	38	1.57	1.72
G	Sporobolus cryptandrus	$_{a}$-	$_{b}$9	$_{a}$-	-	3	-	.04	-
G	Stipa columbiana	-	-	-	-	-	-	-	.00
G	Stipa comata	$_{b}$35	$_{b}$35	$_{a}$1	18	18	1	.36	.15
Total for Annual Grasses		0	7	96	0	3	35	0.01	0.87
Total for Perennial Grasses		537	415	452	210	153	177	9.26	11.65
Total for Grasses		537	422	548	210	156	212	9.27	12.53
F	Astragalus convallarius	-	-	3	-	-	1	-	.00
F	Caulanthus crassicaulis	2	-	-	2	-	-	-	-
F	Castilleja linariaefolia	-	-	1	-	-	1	-	.03
F	Castilleja spp.	-	-	1	-	-	1	-	.03
F	Chaenactis douglasii	-	-	1	-	-	1	-	.00
F	Cymopterus spp.	-	-	1	-	-	1	-	.00
F	Descurainia pinnata (a)	-	$_{b}$19	$_{a}$5	-	7	2	.03	.01
F	Eriogonum cernuum (a)	-	5	-	-	2	-	.03	-
F	Erigeron spp.	3	-	-	1	-	-	-	-
F	Lappula occidentalis (a)	-	$_{a}$-	$_{b}$15	-	-	7	-	.06
F	Phlox longifolia	$_{a}$11	$_{a}$1	$_{b}$47	6	1	21	.00	.15
F	Plantago patagonica (a)	-	$_{a}$10	$_{b}$50	-	5	21	.02	.15
F	Schoencrambe linifolia	-	-	22	-	-	8	-	.04
F	Sphaeralcea coccinea	$_{ab}$23	$_{a}$23	$_{b}$48	11	11	20	.05	.17
F	Thermopsis montana	-	-	1	-	-	1	-	.00
F	Townsendia spp.	-	-	2	-	-	1	-	.00
F	Unknown forb-perennial	1	-	-	1	-	-	-	-
Total for Annual Forbs		0	34	70	0	14	30	0.09	0.22
Total for Perennial Forbs		40	24	127	21	12	56	0.05	0.46
Total for Forbs		40	58	197	21	26	86	0.15	0.68

Values with different subscript letters are significantly different at % = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 16B, Study no: 19

Type	Species	Strip Frequency '94	Strip Frequency '99	Average Cover % '94	Average Cover % '99
B	Artemisia tridentata wyomingensis	86	95	12.75	13.66
B	Atriplex canescens	0	1	-	-
B	Chrysothamnus spp.	0	0	-	-
B	Gutierrezia sarothrae	28	88	.08	3.01
B	Juniperus osteosperma	0	0	1.25	-
B	Opuntia fragilis	75	76	1.29	2.41
B	Pinus edulis	0	3	3.08	4.51
Total for Browse		189	263	18.48	23.60

CANOPY COVER --
Herd unit 16B, Study no: 19

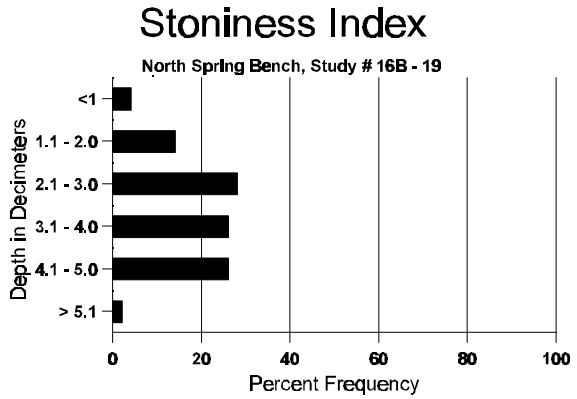
Species	Percent Cover '99
Pinus edulis	10

BASIC COVER --
Herd unit 16B, Study no: 19

Cover Type	Nested Frequency '94	Nested Frequency '99	Average Cover % '88	Average Cover % '94	Average Cover % '99
Vegetation	315	331	12.25	26.72	36.40
Rock	88	25	1.25	1.11	.79
Pavement	101	77	.25	.20	.27
Litter	396	382	27.25	34.23	32.38
Cryptogams	107	211	6.50	2.03	8.32
Bare Ground	342	339	52.50	46.56	36.29

SOIL ANALYSIS DATA --
Herd Unit 16B, Study # 19, Study Name: North Spring Bench

Effective rooting depth (inches)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.0	56.4 (15.6)	7.2	57.3	20.2	22.6	1.2	10.9	51.2	0.6



PELLET GROUP DATA --
Herd unit 16B, Study no: 19

Type	Quadrat Frequency ⁞94	Quadrat Frequency ⁞99	Pellet Transect Days Use/Acre (ha) ⁞99
Rabbit	45	54	n/a
Elk	4	-	0
Deer	76	82	159 (393)
Cattle	0	0	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16B, Study no: 19

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	59	-	-	-	-	-	-	-	-	56	-	3	-	1180			59
	99	27	-	5	6	-	-	-	-	-	36	-	-	-	760			38
Y	88	2	2	-	-	-	-	-	-	-	4	-	-	-	266			4
	94	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
	99	45	8	3	5	9	2	2	-	-	74	-	-	-	1480			74
M	88	1	23	14	1	-	-	1	-	-	40	-	-	-	2666	14	18	40
	94	43	34	5	-	-	-	-	-	-	81	-	-	1	1640	37	35	82
	99	7	-	-	-	14	96	28	-	-	139	1	5	-	2900	17	26	145
D	88	9	22	14	-	1	1	-	-	-	38	-	2	7	3133			47
	94	48	79	14	-	-	-	-	-	-	80	-	-	61	2820			141
	99	3	1	-	-	16	52	24	-	-	57	-	3	36	2000			100
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	1180			59
	99	-	-	-	1	-	-	-	-	-	-	-	-	1	1640			82

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	53%	32%	10%	-24%
'94	49%	08%	27%	+28%
'99	15%	48%	14%	

Total Plants/Acre (excluding Dead & Seedlings)				
'88	6065	Dec:	52%	
'94	4580		62%	
'99	6380		31%	

Atriplex canescens																		
Y	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	3	-	-	-	-	-	-	-	3	-	-	-	60			3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	100%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'88	0	Dec:	-
'94	0		-
'99	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus spp.																		
Y	88	-	-	-	-	-	-	1	-	-	-	-	1	-	66			1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	88	-	2	-	-	-	-	-	-	-	2	-	-	-	133	6	5	2
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	67%	00%	33%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	199	Dec:	-
	'94	0		-
	'99	0		-

Gutierrezia sarothrae																		
S	88	18	-	-	-	-	-	-	-	-	18	-	-	-	1200			18
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	51	-	-	-	-	-	-	-	-	51	-	-	-	1020			51
Y	88	71	-	-	-	-	-	-	-	-	71	-	-	-	4733			71
	94	10	-	-	-	-	-	-	-	-	10	-	-	-	200			10
	99	156	27	3	10	-	-	-	-	-	193	-	-	3	3920			196
M	88	166	10	2	-	-	-	1	-	-	178	1	-	-	11933	7	5	179
	94	32	-	-	-	-	-	-	-	-	32	-	-	-	640	6	6	32
	99	562	47	-	18	-	-	-	-	-	627	-	-	-	12540	4	6	627
D	88	8	-	-	1	-	-	-	-	-	8	-	1	-	600			9
	94	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	99	2	-	-	-	-	-	-	-	-	-	-	-	2	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	04%	.77%	.38%	-95%
'94	00%	00%	00%	+95%
'99	09%	.36%	.60%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	17266	Dec:	3%
	'94	860		2%
	'99	16500		0%

Juniperus osteosperma																		
S	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	0	Dec:	-
	'94	0		-
	'99	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia fragilis																		
Y	88	35	-	-	-	-	-	-	-	-	32	-	3	-	2333			35
	94	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	99	36	-	-	1	-	-	-	-	-	37	-	-	-	740			37
M	88	56	-	-	-	-	-	-	-	-	42	-	12	2	3733	2	4	56
	94	232	-	-	-	-	-	-	-	-	232	-	-	-	4640	2	8	232
	99	190	-	-	-	-	-	-	-	-	160	1	29	-	3800	2	6	190
D	88	17	-	-	-	-	-	-	-	-	10	-	5	2	1133			17
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	17	-	-	1	-	-	-	-	-	1	-	1	16	360			18
X	88	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	-	-	-	-	-	-	-	-	-	-	-	-	-	100			5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	00%	00%	22%	-33%
'94	00%	00%	00%	+ 2%
'99	00%	00%	19%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	7199	Dec:	16%
	'94	4800		0%
	'99	4900		7%

Pinus edulis																		
Y	88	1	2	-	-	-	-	-	-	-	3	-	-	-	200			3
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	99	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	88	-	-	-	-	1	-	-	-	-	1	-	-	-	66	109	118	1
	94	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	99	-	-	-	-	-	-	1	-	-	1	-	-	-	20	-	-	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'88	75%	00%	00%	
'94	00%	00%	00%	
'99	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'88	266	Dec:	-
	'94	0		-
	'99	60		-